

REMARKS

Claims 1-6, 8-11, 19 and 20 are pending and at issue in the application with claims 1, 19 and 20 being the independent claims. Reconsideration and withdrawal of the rejections in view of the remarks below is respectfully requested.

The applicants respectfully traverse the rejection of claims 1, 2, 4, 10, 11, 19 and 20 as unpatentable over Hamzehdoost et al. (U.S. Patent No. 5,430,331) in view of Ohno et al. (U.S. Patent No. 5,227,662), and the rejection of claim 19 as unpatentable over Hamzehdoost et al. The applicants further respectfully traverse the rejections of claims 3, 5, 6, 8, 9 and 11 as unpatentable over Hamzehdoost et al. in view of Ohno et al. and further in view of one or more of Majumdar et al. (U.S. Patent No. 5,703,399), McCarthy et al. (U.S. Patent No. 3,956,726) and Tomita et al. (U.S. Patent No. No. 5,440,169).

Each of claims 1-6 and 8-11 recites a semiconductor power module that includes a heat sink comprising a compound of at least one of AlN and/or BeO. Claim 19 recites a semiconductor power module that includes a heat sink consisting of Al₂O₃. Claim 20 recites a semiconductor power module that includes a heat sink comprising at least one compound comprising BeO. The heat sink of each of claims 1-6, 8-11, 19 and 20 has a surface exposed to the outside of the semiconductor power module.

None of claims 1-6, 8-11, 19 or 20 is obvious over Hamzehdoost et al. in view of Ohno et al. The action does not make out a *prima facie* case of obviousness. In particular, the motivation to combine the references as asserted in the action is improper. Further, one of ordinary skill in the art would not be motivated to combine the references, because Ohno et al. teaches away from the claimed combinations, Ohno et al. teaches away from the disclosure of Hamzehdoost et al., Ohno et al. demonstrates that there is no reasonable expectation of success in the claimed combinations, and Ohno et al. does not recognize advantages of the semiconductor power modules of claims 1-6, 8-11, 19 or 20.

In particular, the motivation to combine Hamzehdoost et al. and Ohno et al. as asserted in the action is improper. Ohno et al. does not disclose or suggest that exposing the heat sink provides good heat dissipation. Instead, Ohno et al. discloses that improved heat dissipation is achieved by dissipating heat through the whole package, and particularly through the lead frame 32. (See column 4, lines 43-53). Even then, Ohno et al. only refers to

a package without a heat sink as having improved heat dissipation. (See Figs. 3A-4).

Accordingly, Ohno et al. does not provide the motivation asserted in the action. Likewise, Hamzehdoost et al. does not appear to provide any discussion of improved heat dissipation by exposing a heat sink, and clearly teaches that a heat sink as recited in claims 1-6, 8-11, 19 and 20 is not exposed to the outside. On the other hand, improved heat dissipation using an exposed heat sink is an advantageous property mentioned in the applicants' disclosure. (See page 8, lines 5-9). Basing the suggestion or motivation to combine on the applicants' disclosure is not a proper basis for asserting a suggestion or motivation to combine. It is clear that to establish a *prima facie* case of obviousness, the teaching or suggestion to make the claimed combination and the reasonable expectation for success must both be found in the prior art, not in an applicant's disclosure. See MPEP 2143.

Further, Ohno et al. teaches away from the claims 1-6, 8-11, 19 and 20 by stating that an insulating adhesive tape 16 bonds a pad (i.e., heat sink) to the lead frame 10. The bonding means 16 provides electrical insulation between the pad (i.e., heat sink) and the lead frame 10. (See Ohno et al., column 2, lines 51-65; Figs. 4, 6 and 7). Ohno et al. therefore teaches those of ordinary skill in the art that the heat sink 40 should not be in direct contact with the lead frame 10, even though the heat sink 40 may be exposed to the outside. As a result, one of ordinary skill in the art would not be motivated by Ohno et al. to provide a heat sink directly contacting a lead frame with a surface of the heat sink exposed to the outside of the module, because Ohno et al. teaches away from any combination that includes a heat sink directly contacting a lead frame, as recited by claims 1-6, 8-11, 19 and 20. The teachings of Ohno et al. against a heat sink directly contacting a lead frame must be considered, because the prior art must be considered in its entirety including disclosures that teach away from the claims. See MPEP 2141.02.

Likewise, Ohno et al. teaches away from the disclosure of Hamzehdoost et al. which discloses an integrated circuit (IC) package having a heat sink 130 that contacts a surface of the lead frame 152. However, as established above, Ohno et al. clearly teaches against a heat sink contacting a surface of the lead frame. As a result, Ohno et al. necessarily teaches away from a heat sink that directly contacts a lead frame, as disclosed by Hamzehdoost et al. One of ordinary skill in the art would therefore not be motivated to combine the IC package of Hamzehdoost et al. with the heat sink of Ohno et al. Accordingly, Hamzehdoost et al. and

Ohno et al. cannot be combined. It is clear that the prior art must make a suggestion of or provide an incentive for a claimed modification or combination of elements to establish a *prima facie* case of obviousness. In re Oetiker, 24 U.S.P.Q.2d 1443, 1446 (Fed. Cir. 1992); Ex parte Clapp, 227 U.S.P.Q. 972, 973 (Bd. Pat. App. 1985). See MPEP 2144. However, it is improper to combine reference where the references teach away from their combination. See MPEP 2145 (X)(D).

In addition, Ohno et al. demonstrates that there is no reasonable expectation of success in using a heat sink in direct contact with a lead frame. As discussed above, Ohno et al. discloses that a heat sink 40 requires an electrically insulating bonding means 16 to provide electrical insulation between the heat sink 40 and the lead frame 10. As a result, Ohno et al. demonstrates that there was no reasonable expectation of success in having a heat sink in direct contact with a lead frame. Indeed, Ohno et al. does not recognize any of the advantages of using a heat sink in direct contact with a lead frame, such as increased heat dissipation and electrical insulation, because the heat sink 40 of Ohno et al. is separated from the lead frame 10 by an electrically insulating bonding means 16. Indeed, Ohno et al. does not recognize the advantages of using a heat sink in direct contact with a lead frame, such as increased heat dissipation and electrical insulation associated with a heat sink in direct contact with a lead frame as recited by claims 1, 19 and 20. As such, Ohno et al. demonstrates there is no reasonable expectation of success or advantage associated with a heat sink in direct contact with a lead frame as recited in claim as recited by claims 1-6, 8-11, 19 and 20, and one of ordinary skill in the art would not be motivated to combined Ohno et al. with the heat sink of Hamzehdoost et al. It is clear a *prima facie* case of obviousness cannot be maintained where the prior art shows there is no reasonable expectation of success. See MPEP 2143.02.

Accordingly, the grounds for rejection of claims 1-6, 8-11, 19 and 20 as asserted in the action fail to present a *prima facie* case of obviousness and the grounds for rejection cannot be sustained.

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For the foregoing reasons, reconsideration and withdrawal of the rejections of the claims and allowance thereof are respectfully requested. Should the examiner wish to discuss the foregoing, or any matter of form, in an effort to advance this application towards allowance, the examiner is urged to telephone the undersigned at the indicated number.

Respectfully submitted,

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